

METHOD OF AND ARRANGEMENT FOR PROJECTION AND  
RECEPTION OF VISUAL AND AUDIOVISUAL MESSAGES, AND  
ANALYSIS THEREOF TO DETERMINE THE RADIUS OF  
ACTION AND CUSTOMER BEHAVIOR

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**BACKGROUND OF THE INVENTION**

The invention relates to a method of and arrangement for projection and reception of visual and audiovisual messages and analysis thereof to determine the customer behavior.

10 The audiovisual advertising is known via TV sets set up in suitable places in sales rooms. Furthermore, it is known to use TV combinations and TV-panels, respectively, (US 4 866 530, DE 37 20 468 A1) for advertising purposes. Furthermore, LCD- and laser projectors are employed for the enlarged projection of messages. However, such  
15 arrangements and methods are technically very expensive and, concerning a mounting which is in conformity to the architecture, not suited or at least non-flexible due to their comparatively large dimensions, their high weight and the high thermic development involved.

20 Furthermore, a system has already been proposed for recording sales figures and/or sale times (DE 195 37 895 A1), wherein by means of a central questioning unit at different places of a sales area, the number of sold newspapers is registered. Furthermore, it is known from DE 36 09 933 A1 to call up product illustrations from a central storage for  
25 presentation purposes. Finally, according to EP 0 697 670 A1 customers in a retail-shop may obtain informations about the location

of a searched for product by pressing a press button at their shopping cart. However, no statement is possible in this way concerning the customer behavior or the shopping behavior in dependence on advertising.

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## **SUMMARY OF THE INVENTION**

Therefore, it is an object of the present invention to provide a universally usable, flexibly mountable and linkable arrangement of the projection of visual and audiovisual, respectively, messages and signals  
10 which can be programmed, controlled, and verified, as well as for analyzing customers behavior in consumption sections, and a method suitable thereto.

## **DETAILED DESCRIPTION OF THE INVENTION**

15 According to the invention the object is realized by the features of the first patent claim. It is important that the inventional method permits to exactly determine the purchasing behavior of a group of customers in any desired territory. In this case, the potential buyers (recipients) can be confronted with new products or goods which are part of a broad  
20 sales assortment. The customers of products or goods can also be the recipients of services.

An arrangement for carrying out said method shows the following features:

- at least one range with at least one first sensor at an input of said  
25 range for deriving first counting signals and at least a second sensor at an output of the range for deriving second counting signals,

- at least one display in the range of offering messages,
- a cash register for counting the bought products, and
- a computer for recording and evaluating the counting signals derived from the sensors and for controlling the display.

5 The evaluation of the sensor signals has the task to determine the potential buyers as recipients and, hence, the communication range. To this end the difference is formed from the second and the first counting signals. When this difference is zero, the display does not need to be ON. The computer also is designed as an image storage device for the

10 messages to the display which is adapted to be architectonically and ergonomically favorably arranged, said messages being stored on video CD, for example. The computer can receive the control program for the actual and locally differentiated projection mode from a central station. In order that the purchaser behavior can be determined over an entire

15 area or country, the computers of the individual arrangements, each of which being associated to, for example, a shopping-center, are cross-linked with the central station which permits a central evaluation of the data obtained in the individual supermarkets and additionally allows the determination of a mean value of the purchaser behavior.

20 Particularly, when worldwide linked this is preferably achieved via satellite. When informations are requested about the usual purchase behavior in a territory, then only the data of this territory are taken into consideration for evaluation. According to an improvement of the arrangement there are provided two ranges which are connected to one

25 another via a passage, wherein at least a third sensor is located at said passage, the display being in the first range and the products in the

second range. In this case, the second sensor located at the exit of the second range can detect both, the number of customers and of products and can be integral part of a cash register, preferably of an electronic cash register.

- 5 The display is preferably designed as a fiber-optical display which consists of a field display, upon which optical images are generated from electronic ones on framed displays or monitors and the same are joined without margins in a projection plane via light conducting fibers or bundles thereof which are arranged in lines and columns. The video  
10 diagonal of the fiber optical display can amount to 1 to 2 m and more. There are different possibilities both, for embodiment of the fiber optical displays and for the arrangement of the same. Anyhow, it is advantageous to set up the fiber-optical display by modules, the light entry faces of which are of standard size with respect to the  
15 conventional screen sizes for TV sets and monitors. The displays can be arranged in upright, suspended or inclined position, individually or in combination with one other. A favorable arrangement of displays comprises 2, 3, 4, 6 or 8 displays arranged regularly, preferably inclined. Advantageous angles of inclination relative to a vertical line  
20 amount to  $30^\circ$ ,  $45^\circ$  or  $60^\circ$ , depending on the respective conditions.

The present invention permits a programmable, sensor-controlled and recordable projection of visual or audiovisual messages or signals on universal and large-area displays which are adaptable to the architecture. The recorded data of the projection and of the reception  
25 (point of time, frequency, duration and range) are coupled to the consumption data registered via scanners in the electronic cash

registers. The projections data, the reception data, and the consumption data from the individual intentional arrangements as well as the programming and control of the same are adapted to be variably and flexibly cross-linked locally, regionally, and interregionally, for example, according to the so-called Nielsen-areas, with respect to contents, product groups, target groups, and timing.

### **DETAILED DESCRIPTION OF THE INVENTION**

The invention will be explained hereinafter in more detail by means of the schematic drawing. There is shown in:

- Fig. 1 a first intentional arrangement in block diagram,
- Fig. 2 a second intentional arrangement in block diagram,
- Fig. 3 a general setup of an intentional fiber-optical display,
- Fig. 4 a perspective view of an embodiment of a fiber-optical display, Fig. 5 a perspective view of two fiber-optical displays in inclined arrangement,
- Fig. 6 a plan view of four fiber-optical displays in inclined arrangement, Fig. 7 a plan view of eight fiber-optical displays in inclined and regular arrangement,
- Fig. 8 a plan view of a frame-like arrangement of continuous display areas of a range,
- Fig. 9 a plan view of a frame-like arrangement of partial display areas of a range,
- Fig. 10 a plan view of an exclusively parallel arrangement of display areas, and
- Fig. 11 a plan view of a diagonal arrangement of display areas.

Fig. 1 comprises a first arrangement 1 of two ranges 2 and 3, which are limited by sensors 4, 5, 6. The latter can be embodied as IR, HF, CCD or radar sensors. In range 2 there is arranged an architectural and ergonomically adapted large-area display 7 for the visual and audiovisual representation of messages, signals, advertising information or other information. The display 7 is arranged ergonomically favorably for customers, preferably at a raised and inclined position. In range 3, inter alia, the products or goods for which field 2 advertises on display 7 are available and for sale, respectively. Both, the sensors 4, 5, 6 and the display 7 are connected to a computer 8 which receives the signals delivered by the sensors and evaluates the same for purchasing analysis. The computer includes an image storage for the display and also controls the display 7. The computer 8 which preferably is embodied as a PC is connected, in turn, to a central detection and evaluation unit 9 which is cross-linked to further computers of other and identical arrangements 10, 11, 12.

Customers, that is, potential purchasers 14 pass through an entry 13 into the range 2; their number is detected by the sensor 4 which feeds respective signals into the computer 8. In the range 2 the potential purchasers 14 are made known to specific products and goods available in range 3 via the display 7, thus being turned into recipients. Then, each potential customer 14 can leave range 2 by the entry 13 or can pass into range 3 via a passage 15, where he, inter alia, can get or take those products (that product) 142 which were advertised in range 2. When leaving by the passage 15 the potential buyer 14 is again counted, namely by the sensor 5 and a respective signal is delivered to

the computer 8 which from the counting difference of the sensors 4 and 5 derives a respective signal output to switch ON and to switch OFF, respectively, the display 7. Sensors 4, 5, 6 can be light barriers, motion detectors, induction loop detectors or the like. The potential customer can become an actual buyer 141 when he leaves range 3 by an exit 16 and his/her recorded purchasing behavior is detected. To this end the exit is provided with a cash register, preferably an electronic cash register that is coupled to sensor 6 which signalizes to the computer 8 how many recipients 14 leave range 3 and how many specific products, for which advertising messages had been sent, were bought. The recorded projection and customer data are stored in computer 8 for a correlation analysis. In this way, the advertising can be related to frequency, radius of action, products and time. The computer 8 feeds the data into the central detection and evaluation unit 9 which compares the advertising effect and the buying behavior in different territories, detects an average advertising effect and buying behavior in larger territories and provides the basis for measures for further advertising activities and the supply of goods and the distribution of goods, respectively.

In Fig. 2, a second arrangement 17 is schematically and in plan view represents a petrol station 18. A filling-up zone 19 is limited by an inlet sensor 20 and an outlet sensor 21. In the filling-up zone 19, a display is arranged and embodied in a manner which is still to be described in, for example, connection with Fig. 3 to 10. Furthermore, the arrangement 17 includes a car shop 23 in which goods are sold, which are audiovisually advertised for on a display 22, and which further includes

a cash register 24 and a computer 25. The computer 25 is connected via signal lines 26 to the inlet sensor (or sensors) 20 and the outlet sensor (or sensors) 21, the display 22, as well as to the cash register 24, via which the computer 25 receives the signals from the sensors 20, 21 and from the cash register 24 and controls the display 22. Similar to Fig. 1, the computer 25 can be connected to a central detection and evaluation. As to the rest the method is the same as described in connection with Fig. 1 under consideration of the specific conditions for the customer in a petrol station shop.

10 In Fig. 3 a section of a large-area fiber-optical display 27 is shown. The latter consists of monitors 28 whereupon optical partial images are electronically generated, each of which having a peripheric margin 29 which is technologically conditioned. In adjacent frontal opposition to the screens of the monitors 28 smooth end faces 30 of light conducting fibers 33 adhesively connected to one another via their end portions 31, 32 are provided, the remotely arranged, also smooth end faces 34 of said light conducting fibers 33 constitute an observation plane or projection plane 35 which is provided with a phosphorescent layer 36. The light conducting fibers 33 can be rigid or flexible in entity; they can be made of glass or epoxy, can have a conical or cylindrical shape and can be embodied as monomode or multimode fibers. According to the technical requirements, however, within the frame of feasibility, they can exhibit neckings 37 or can be embodied without the latter. The light conducting fibers (or bundles of fibers) 33 are preferably combined to standardized blocks 38, which are individually exchangeable, the smooth end faces 30 of which exhibit the same



geometry as the screens of the monitors 28. Within each of the blocks 38 the fibers (and bundles of fibers, respectively,) 33 are arranged in lines and columns. The light conducting fibers 33 produce an image which is identical to the partial images in the observation plane or projection plane 35, however, without margins 29; they are joined together without margin. For reasons of representation, there are considerably less light conducting fibers 33 shown in block 38 in Fig. 3 than existing in reality. Moreover, the fiber-optical display 27 consists of more blocks 38 than represented. Instead of being arranged in parallel the monitors 28 can be arranged diagonally to the observation plane (projection plane) 35.

In Fig. 4 a technical embodiment of a fiber-optical display 27 is represented. The blocks 38 of the light conducting fibers 33 are indicated on the upper area of a housing 55. The smooth ends 34 of the light conducting fibers 33 form the projection area 35 which is provided with a luminous layer 36. The projection format of the fiber-optical display 27 is 16:12, its maximum thickness is 20cm and its minimal diagonal 1m.

In Fig. 5 two fiber-optical displays 39, 40 are mounted on a mounting frame 41 mutually inclined at an angle of  $60^\circ$ . The angle of inclination depends on the local conditions and requirements; it can be, for example, also  $90^\circ$  or  $120^\circ$ .

In Fig. 6, four identical displays 42 are mounted to a mounting frame 43 under an angle of  $30^\circ$  to  $45^\circ$  relative to a fictitious mounting plane which is in parallel to the drawing plane so that the presentation

simultaneously appearing on the displays 42 substantially is detectable from all sides.

In Fig. 7 eight identical displays 44 are arranged under an angle of  $30^\circ$  relative to the mounting plane in parallel to the drawing plane on a mounting frame 45 so that a further improvement of the all-round  
5 visibility of the displays 44 is achieved.

Fig. 8 shows by example of a petrol station 46 with petrol pumps 47 the arrangement of closed display areas 48 which are inclined by about  $45^\circ$  relative to the vertical line along a horizontal roof edge 49. The  
10 roof edge, however, is omitted for reasons of representation. It is feasible to simultaneously realize different presentations on the display areas 48.

Fig. 9 distinguishes from Fig. 8 by the use of partial display areas 50 which, arranged under the roof of the service station, are visible from  
15 almost all sides by a potential customer. It is self-understood that on said displays there have to be represented not only products and also not only goods which are on sale at the petrol station.

Fig. 10 renders visible display areas 51 which, under a not represented roof of the petrol station, are arranged suitably inclined for each lane in  
20 each driving direction for being viewed from the front.

In Fig. 11, inclined display areas 52 are mounted, diagonally relative to the roof edges 54, in accordance with the arrangement of petrol pumps 53 and lanes. The central mutually inclined display areas can be mounted similar to the same described in Fig. 5.

25 The invention is not restricted to the embodiments disclosed. Thus, for example, the display areas need not be arranged, as shown in Fig. 8 and

9, along each roof edge. It is also feasible to centrally arrange a mounting frame provided with a plurality of displays in a range or room. When IR sensors, CCD-sensors, and radar sensors are employed the detection of counting and motion pulses logically is performed at  
5 the entry and at the exit of a recipient and at the stay of the same in the detection range. Neither is the application restricted to retail shops and petrol stations. In the same manner, it is feasible to employ arrangements of displays at bus stops and railway stops, on railway stations, in waiting zones, in terminals, in pedestrian precincts etc., and  
10 in adequate manner for optional information purposes. Finally, the individual features of the invention can be combined with one another in different ways. This concerns both the ranges, the sensors and also the displays.

## LIST OF REFERENCE NUMERALS

1, 10, 11, 12, 17	- arrangements
2, 3	- ranges
4, 5, 6	- sensors
7, 22, 27, 39, 40, 42, 44	- displays
8	- computers
9	- central detection and evaluation unit
13	- entry
14	- potential customer
15	- passage
16	- exit
18	- patrol station
19	- filling-up zone
20	- inlet sensor(s)
21	- exit sensor(s)
23	- car shop
24	- (electronic) cash register
25	- computer
26	- signal lines
28	- monitors
29	- margin
30, 34	- end faces
31, 32	- end portions
33	- light conducting fibers/bundle of light conducting fibers
35	- observation or projection planes
36	- luminous layer
37	- necking
38	- block
41, 43, 45	- mounting frame
46	- petrol station
47, 53	- petrol pumps
48, 50, 51, 52	- display areas
49, 54	- roof edge
55	- housing
141	- actual buyer
142	- product